Lusher St Feb

LUSHER STREET

GROUND WATER INVESTIGATION

ELKHART, INDIANA

Prepared For:

U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois

CONTRACT NO. 68-01-7367

TAT-05-N-00045

TDD NO. 5-8710-16

Prepared By:

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Region V

January 1988

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1.0 SITE DESCRIPTION

The City of Elkhart is located in Elkhart County in north-central Indiana (Figure 1). The Lusher Street site under investigation encompasses a 46 square block residential-industrial area on the southwest side of Elkhart (Figure 2). The area is bordered to the north by the St. Joseph River, to the west by State Road 19, to the east by Avalon Street (north of Lusher Street) and 15th Street (south of Lusher Street), and to the south by Leininger Street.

The topography of the area is generally flat (0 to 2 percent slopes) with run-off flowing north towards the St. Joseph River. Soils in the area are of the Oshtemo-Fox Association (USDA 1974). In a representative profile the association varies from loamy sand to sandy loam to coarse sand and gravel at a depth of 4 to 5 feet. Oshtemo soils typially have a low available moisture capacity and a low organic matter content. In addition, they are characterized by a moderately rapid permeability and slow run-off. Underlying strata consist of glacial outwash deposits whose average depth is 175 feet. Interbedded within these deposits is a layer of silt and clay whose maximum thickness is 80 feet and average thickness is 20 feet. Where present, this layer divides the outwash deposits into two aquifers and confines the deeper aquifer (Imbrigiotta and Martin, 1981). In the area currently under investigation the confining silt and clay layer is absent. The direction of ground water flow in the area is northeasterly, also towards the St. Joseph River.

The predominant contaminants detected in water wells in this area were trichloroethylene (TCE) (71 to 804 parts per billion (ppb)) and 1,1,1-trichloroethane (1,1,1-TCA) (257 to 3,800 ppb).

2.0 SITE BACKGROUND

While conducting a Potential Responsible Party (PRP) extent-of-contamination survey, Gemeinhardt, Inc., detected contamination in several wells in the four square block area immediately south of Lusher Street. Gemeinhardt, Inc., situated approximately 3/4 mile south of Lusher Street believed the contamination in this area was independent of the plume they were addressing, therefore, no further actions were taken and the Elkhart County Health Department (ECHD) was notified. Subsequently, the ECHD executed an all-inclusive sampling effort within the area bordered by State Road 19 on the west, 15th Street on the east, Leininger Street to the south, and Lusher Street to the north. As preliminary analytical results indicating widespread contamination were received, the sampling effort was expanded to include an area north of Lusher Street. This sampling effort included

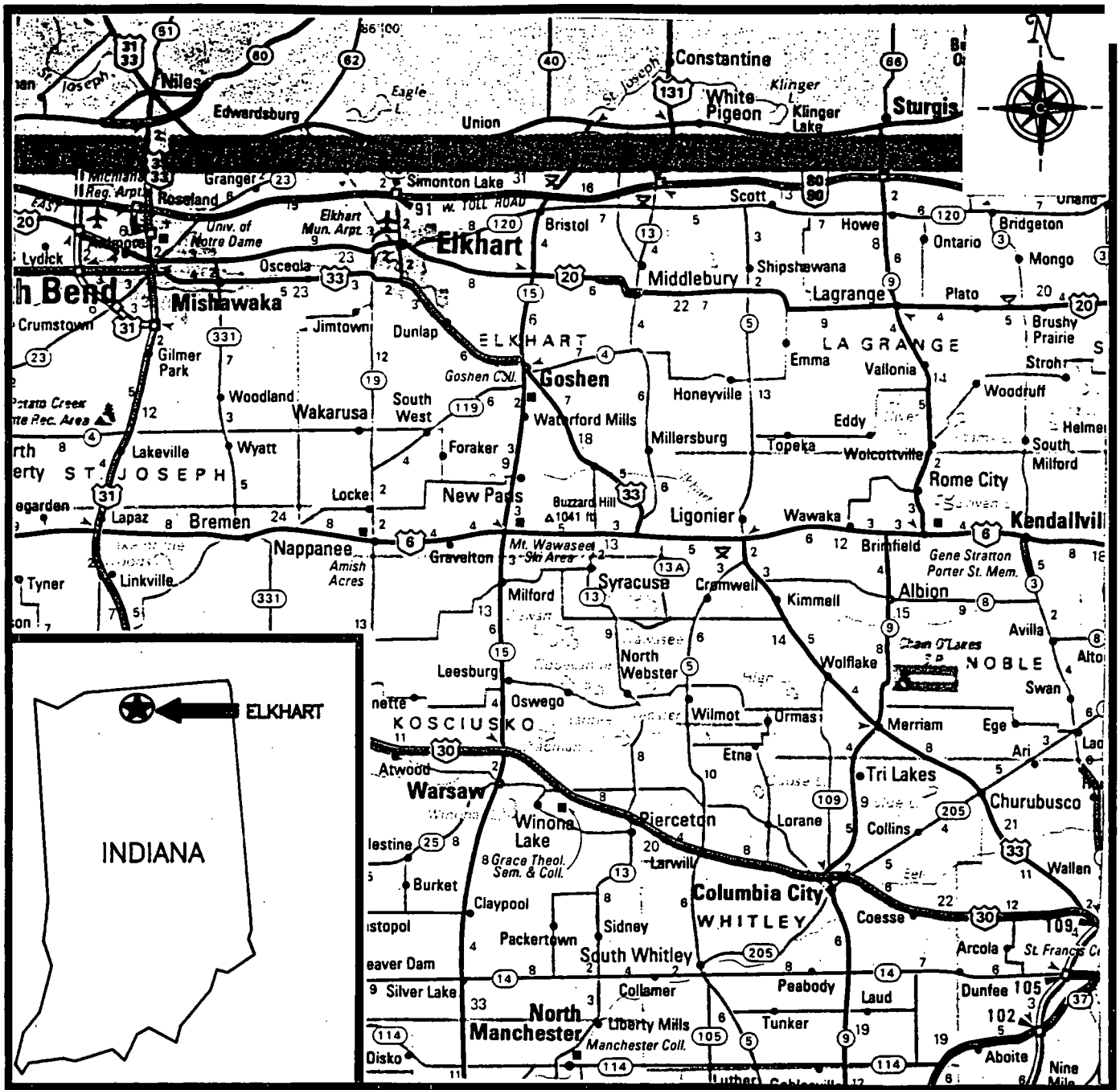

FIGURE 1

SITE LOCATION MAP

LUSHER STREET

GROUNDWATER CONTAMINATION

ELKHART, INDIANA

1 INCH = 15 MILES

WESTON

DRAWN BY	DATE	PCS #
JEFF BINKLEY	12-21-87	1364
APPROVED SALLY MATZ	DATE 12-21-87	TDD # 5-8710-16

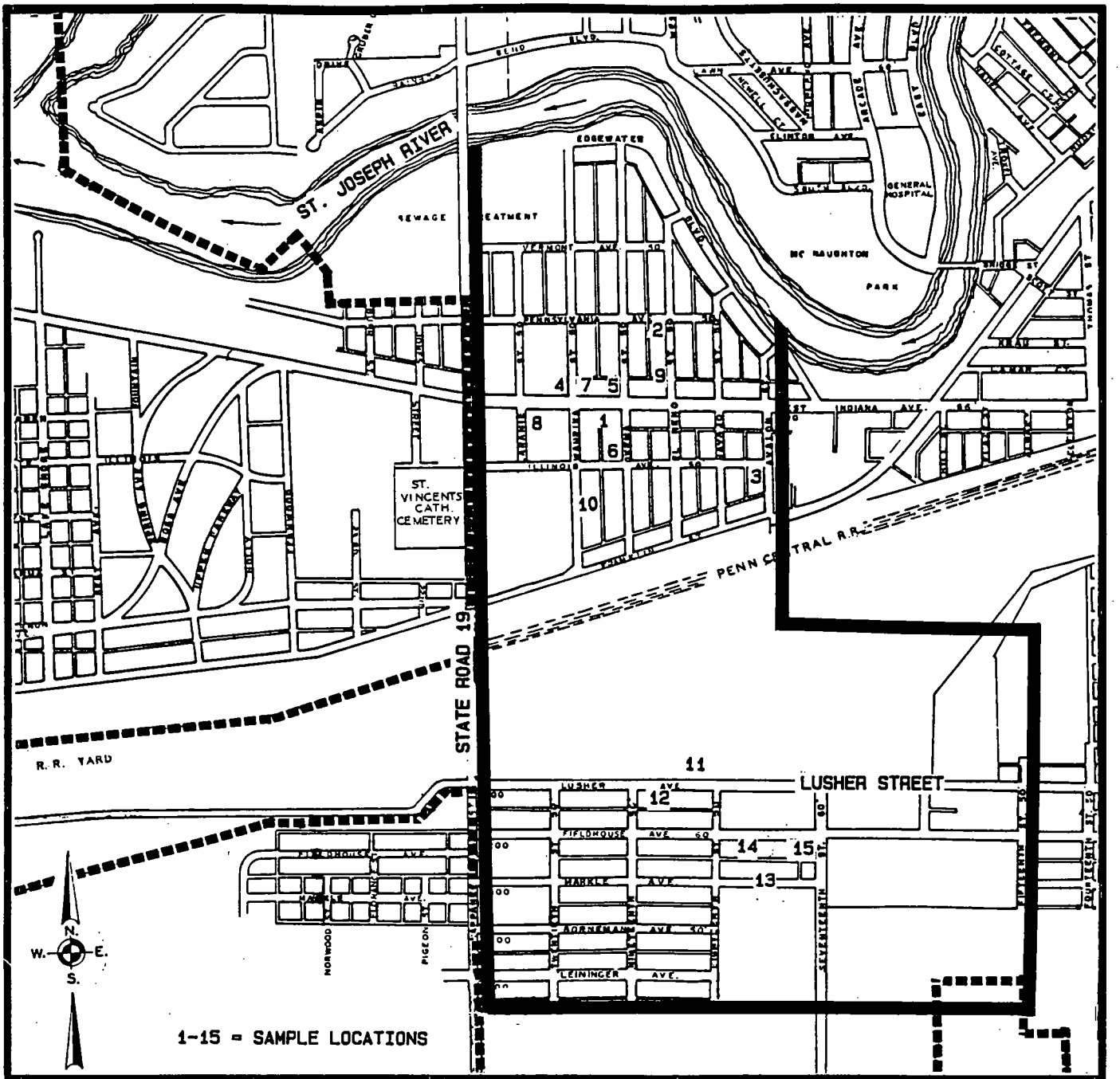

FIGURE 2
SITE MAP
LUSHER STREET
GROUNDWATER CONTAMINATION
ELKHART, INDIANA

0 100' 500' 1,000' 1,500'

WESTON

DRAWN BY SB	DATE	PCS #
JEFF BINKLEY	12-21-87	1364
APPROVED SAM	DATE	TDD #
SALLY MATZ	12-21-87	5-8710-16

all wells within an area bordered by State Road 19 to the west, Avalon Street to the east, Lusher Street to the south and the St. Joseph River to the north.

In total, the ECHD sampled 145 wells identifying 103 which were contaminated with 1,1,1-TCA and/or TCE. Fifteen of the 103 affected wells were found to contain levels that exceeded or were within 50% of the U.S. Environmental Protection Agency (U.S. EPA) removal action level for TCE (128 ppb) and/or 1,1,1-TCA (500 ppb) (Table 1). Subsequently, the ECHD requested assistance from the U.S. EPA in providing alternate drinking water supplies to the affected residents and businesses.

3.0 SITE ASSESSMENT

On October 30, 1987 Technical Assistance Team (TAT) member Jeff Binkley met with ECHD officials and reviewed their analytical results to evaluate the extent of the contaminant plume. The TAT constructed a map of the area indicating ECHD results and developed a sampling plan to verify previous results and begin to define the extent-of-contamination. On November 3, 1987 TAT member Jeff Binkley sampled four of the wells previously sampled by the ECHD to confirm their results and evaluate the immediate threat to human health. The samples were analyzed for volatile organics by Aqualab, Bartlett, Illinois, under TAT Analytical Services TDD# 5-8711-L1.

4.0 ANALYTICAL RESULTS

The analytical results confirmed the ECHD findings at all four locations (Table 2). Of greatest concern were the levels of 1,1,1-TCA (1,590 ppb) at 2121 W. Indiana and TCE (804 ppb) at 2205 17th Street which exceeded the U.S. EPA removal action level and the Agency for Toxic Substance and Disease Registry (ATSDR) recommended bathing standards of 500 ppb and 130 ppb, respectively.

Although TCE and 1,1,1-TCA were present in both areas, TAT and ECHD analytical results indicate that the predominant contaminant north of Lusher Street is 1,1,1-TCA, while south of Lusher Street the prevalent contaminant is TCE. These varying concentrations suggest that multiple plumes or sources are affecting the water quality in the two areas.

TABLE 1

LUSHER STREET GROUND WATER INVESTIGATION

ELKHART, INDIANA

Map #	Resident	Contaminant	Concentration	Accepted Filter	Installed
4	Kathy Carmichael Interior Access 1620 Waurika #295-3860	1,1,1-TCA	263	Yes	11-23-87
6	David Roth 2200 W. Indiana #295-8311	1,1,1,-TCA	266	Yes	11-24-87
8	Susan Frick 2108 W. Indiana #295-1402	1,1,1-TCA	719	Yes	11-24-87
9	Ray Powers 1529 Okema #295-7843	1,1,1-TCA	330	Yes	11-27-87
3	Homan Lumber 1650 Lusher #293-6595	1,1,1-TCA TCE	3,800 608	Yes	11-24-87 (larger filter installed 12-10-87)
1	Glass Master 1720 Markle #293-4195	TCE	93	Yes	12-03-87
7	Scott Wilsey 2124 W. Indiana #294-6275	1,1,1-TCA	572	Yes	12-09-87
5	Genevieve Blocher 2217 W. Indiana	1,1,1-TCA	257	Yes	12-03-87
2	Mac McCreary 1741 Fieldhouse #294-5343	TCE	71	Yes	12-03-87
11	Linnie Bentley 1429 El Reno #293-5676 (her son)	1,1,1-TCA	358	Yes	12-04-87
	Sotebeer Construction 1747 Lusher #295-0166	1,1,1-TCA TCE	516 390	No	

TABLE 1 (Continued)

LUSHER STREET GROUND WATER INVESTIGATION

ELKHART, INDIANA

Map #	Resident	Contaminant	Concentration	Accepted Filter	Installed
10	Chris Hargrove 1601 Avalon #294-6134	TCE	106	Yes	12-09-87
14	Ken Speraw 1401 El Reno #293-9134	1,1,1-TCA	272	Yes	12-04-87

CITY HOOKUP:

	Resident	Contaminant	Concentration	Accepted Filter	Installed
13	Francis Neitzke 2121 W. Indiana #293-6777	1,1,1-TCA	1,590	Yes	12-02-87
12	Ed Miller 2205 17th Street #293-1395	TCE	804	Yes	~~12-16-87~~ 12-31-87

TABLE 1

ANALYTICAL RESULTS OF ECHD SAMPLING*
LUSHER STREET GROUND WATER CONTAMINATION
ELKHART, INDIANA

SEPTEMBER 15 - OCTOBER 29, 1987

Sample Location	Corresponding Location (Figure 2)	Contaminant	Concentration
Neitzke Residence 2121 W. Indiana	1	1,1,1-TCA TCE	827 ppb 45 ppb
Speraw Residence 1401 El Rono	2	1,1,1-TCA TCE	276 ppb 21 ppb
Hargrove Residence 1601 Avalon	3	1,1,1-TCA TCE	97 ppb 160 ppb
Roth Residence 2200 W. Indiana	4	1,1,1-TCA TCE	266 ppb 4 ppb
Frick Residence 2108 W. Indiana	5	1,1,1-TCA TCE	719 ppb 30 ppb
Powers Residence 1529 Okema	6	1,1,1-TCA TCE	330 ppb 4 ppb
Wilsey Residence 2124 W. Indiana	7	1,1,1-TCA TCE	572 ppb 30 ppb
Blocher Residence 2217 W. Indiana	8	1,1,1-TCA	257 ppb
Bentley Residence 1429 El Reno	9	1,1,1-TCA TCE	358 ppb 16 ppb
Interior Access 1620 Waurika	10	1,1,1-TCA TCE	263 ppb 9 ppb
Homan Lumber 1650 Lusher	11	1,1,1-TCA TCE	3,800 ppb 608 ppb
Sotebeer Construction 1747 Lusher	12	1,1,1-TCA TCE	516 ppb 390 ppb

TABLE 1 (Continued)

Sample Location	Corresponding Location (Figure 2)	Contaminant	Concentration
Glass Master 1720 Markle	13	1,1,1-TCA TCE	34 ppb 93 ppb
McCreary Residence 1741 Fieldhouse	14	1,1,1-TCA TCE	24 ppb 71 ppb
Miller Residence 2205 17th Street	15	1,1,1-TCA TCE	34 ppb 1,390 ppb

*Samples Analyzed by ECHD Lab.

TABLE 2

ANALYTICAL RESULTS OF TAT SAMPLING*

LUSHER STREET GROUND WATER CONTAMINATION

ELKHART, INDIANA

NOVEMBER 3, 1987

Sample Location	Corresponding Location (Figure 2)	Contaminant	Concentration
Miller Residence 2205 17th Street	15	1,1,1-TCA TCE	3.2 ppb 804 ppb
Neitzke Residence 2121 W. Indiana	1	1,1,1-TCA TCE	1,590 ppb 38.5 ppb
Hargrove Residence 1601 Avalon	3	1,1,1-TCA TCE	49 ppb 106 ppb
Speraw Residence 1401 El Reno	2	1,1,1-TCA TCE	140 ppb 20 ppb

*Samples Analyzed by Aqualab, Bartlett, Illinois.

5.0 THREATS TO HUMAN HEALTH AND THE ENVIRONMENT

5.1 Threats as Related to the National Contingency Plan

Paragraph (b)(2), Section 300.65 of the National Contingency Plan (NCP) outlines several conditions that must be considered to warrant a removal action. These conditions, two of which exist at the Lusher Street area, and which will be elaborated on within the following subsections are:

- Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals or food chain; and,

- Actual or potential contamination of drinking water supplies or sensitive ecosystems.

Based on the preceding considerations, contaminated water wells in the Lusher Street area pose a substantial and imminent threat to human health.

5.1.1 Actual or Potential Exposure

The presence of TCE and 1,1,1-TCA contaminated ground water beneath the Lusher Street area has been documented by both the TAT and the ECHD. These contaminants pose a threat of exposure as local residents and businesses utilize ground water from the contaminated aquifer.

5.1.2 Actual or Potential Contamination of Drinking Water Supplies

Ground water contamination has been documented in the Lusher Street area by both the TAT and the ECHD. Of 103 affected wells, 11 were found to contain levels exceeding or within 50% of the U.S. EPA's removal action levels. In addition, 4 wells contained levels exceeding ATSDR recommended bathing standards. Given the local geological conditions and contaminants present in the area, the potential for further contamination of the local ground water reservoir exists.

5.2 Threats as Related to Specific Chemical Contaminants Located On-Site

The TCE and 1,1,1-TCA contamination recently documented in the Lusher Street area poses health threats via direct contact, inhalation, and ingestive routes of exposure.

5.2.1 1,1,1-Trichloroethane

1,1,1-TCA, a non-carcinogenic volatile organic compound, affects the skin, eyes, cardiovascular system and central nervous system. Liquid and vapor 1,1,1-TCA are irritating to eyes on contact and may cause conjunctivitis. Repeated skin contact may produce a dry, scaly, and fissured dermatitis. In addition, 1,1,1-TCA acts as a narcotic and depresses the central nervous system. Acute exposure symptoms include dizziness, incoordination, drowsiness, decreased reaction time and unconsciousness.

5.2.2 Trichloroethene

TCE, a carcinogenic volatile compound, affects the respiratory system, heart, liver, kidneys, skin, and central nervous system. Exposure to TCE vapor may cause irritation of the eyes, nose and throat. Liquid TCE may cause burning and irritation to the eyes and dermatitis as a result of prolonged skin exposure. Acute exposure to TCE depresses the central nervous sytem exhibiting such symptoms as headache, dizziness, vertigo, tremor, nausea and irregular heartbeat. The U.S. EPA Office of Solid Waste and Emergency Response has assigned TCE a 10^{-4} cancer risk level of 280 ppb.

6.0 RECOMMENDATIONS

Because of the imminent threats posed to human health by the Lusher Street area the TAT recommends that a two phase action be implemented in a timely manner. Phase I should provide immediate alternate water supplies to the residents and businesses with wells containing contaminant levels which exceed or are within 50% of the U.S. EPA removal level. Phase II should include an extent-of-contamination study and possible implementation of permanent corrective measures.

6.1 Phase I

Two options were considered for providing alternate drinking water supplies, bottled water and point-of-use carbon filters. Cost comparisons and logistics indicated that installation of point-of-use carbon filters was the preferred option at 11 locations. At two locations, where contaminant levels exceed the capabilities of point-of-use carbon filters, the TAT recommends the installation of larger carbon filters. In addition, the TAT recommends that the two residents affected by contaminant levels exceeding ATSDR bathing standards be immediately hooked-up to city water.

6.1.1 Costs for Phase I

Subcontracted

Items		Amount
11 Point-of-Use Carbon Filters @ $225.00/filter, installed		$ 2,475.00
2 3.5 Cubic Foot Carbon Filters @ $750.00/filter, installed		1,500.00
2 City Hook-Ups @ $1,500.00/hook-up		3,000.00
3% ODC		209.25
	Sub-Total	$ 7,184.25

TAT Costs

Items		Amount
50 hrs. x $45.00/hr. (Office)		$ 2,250.00
40 hrs. x $65.00/hr. (Field)		2,600.00
	Sub-Total	$ 4,850.00

EPA Costs

Items		Amount
40 hrs. x $91.00/hr.		$ 3,640.00
	Sub-Total	$ 3,640.00

6.1.2 Phase I - Cost Summary

Items		Amount
Subcontracted		$ 7,184.25
TAT Costs		4,850.00
EPA Costs		3,640.00
	Phase I TOTAL	$ 15,674.25

6.2 Phase II

Phase II should include an extent-of-contamination study to involve the collection of 50 additional samples to be analyzed for volatile organic analyses. Cost estimates were formulated with the assumption that analytical results would dictate the necessity to hook-up 50 additional residences and businesses to city water.

6.2.1 Phase II Costs

Subcontracted

Items		Amount
50 City Hook-Ups @ $1,500.00/hook-up		$ 75,000.00
3% ODC		2,250.00
	Sub-Total	$ 77,250.00

Analytical

Items		Amount
50 Samples for VOA Analysis @ $300.00/sample		$ 15,000.00
	Sub-Total	$ 15,000.00

TAT Costs

Items		Amount
40 hrs. x $45.00/hr.		$ 1,800.00
40 hrs. x $65.00/hr.		2,600.00
	Sub-Total	$ 4,400.00

EPA Costs

Items		Amount
40 hrs. x $91.00/hr.		$ 3,640.00
	Sub-Total	$ 3,640.00

6.2.2 Phase II Cost Summary

Items		Amount
Subcontracted		$ 77,250.00
TAT Costs		4,400.00
EPA Costs		3,640.00
	Phase II TOTAL	$ 85,290.00

7.0 TOTAL PROJECT COST SUMMARY

Contractor		
Phase I	$ 7,184.25	
Phase II	77,250.00	
15% Contingency	12,665.14	
Sub-Total		$ 97,099.39
TAT Costs		
Phase I	$ 4,850.00	
Phase II	4,400.00	
Sub-Total	$ 9,250.00	
15% Contingency	15,952.41	
Extramural TOTAL		122,301.80
EPA Costs		
Phase I	$ 3,640.00	
Phase II	3,640.00	
Intramural TOTAL		7,280.00
	PROJECT TOTAL	$129,581.80
		OR
		$130,000.00

REFERENCES

Imbrigiotta, T.E., and A. Martin, Jr. "Hydrologic and Chemical Evaluation of the Ground Water Resources of Northwest Elkhart County, Indiana." USGS Water Resources Division Investigation 81-53. 1981.

USDA Soil Conservation Service, "Soil Survey of Elkhart County." 1974.